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The American Biology Teacher

Vol. 13 JANUARY, 1951 No. 1

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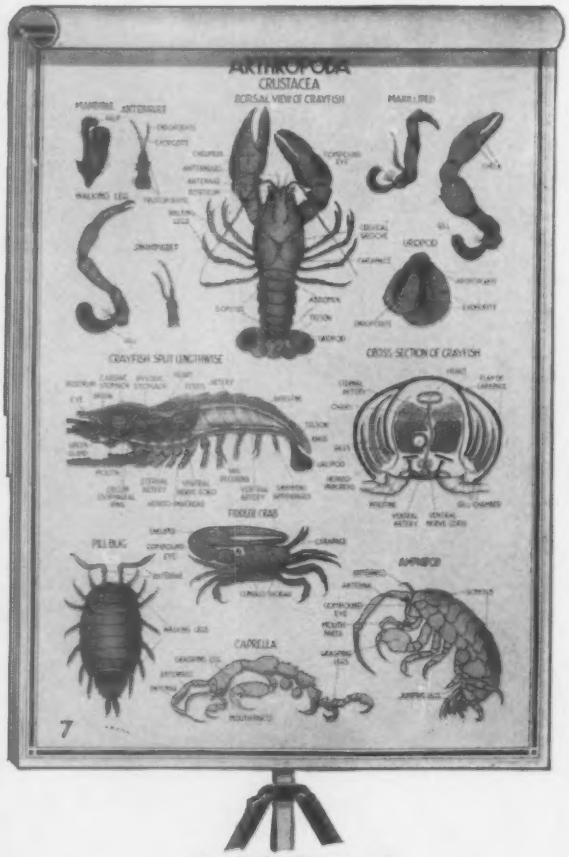

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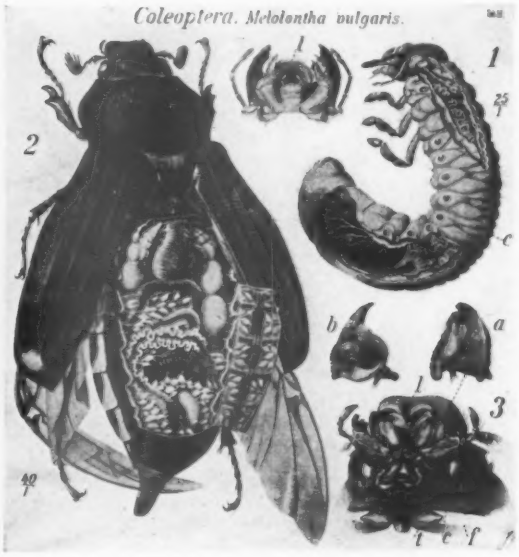

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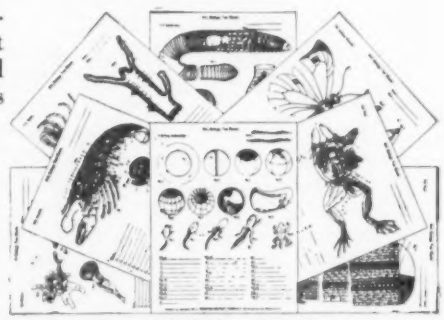

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Vol. 13 JANUARY, 1951 No. 1

The Preparation of Microscopical Sections for Biological Laboratories

W. V. COLE

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INTRODUCTION

Many laboratories do not use microscopical techniques in teaching biology because the equipment necessary for the preparation of histological sections is believed to be elaborate and expensive. Many structures can be adequately examined microscopically, as body fluids, membranes and even sections of organs, by techniques that are easy to use and not prohibitive in cost.

Contrary to general opinion it is not necessary to use long and complicated methods for the demonstration of cellular morphology even though the observation of such structures in thick tissues or organs is desirable. There are two common methods of rendering cells of organs visible microscopically, first, by separating the elements and, second, by cutting thin sections maintaining the relationship of the elements. It is also essential to stain individual parts of the cell with contrasting colors to permit efficient visual observation.

With the advent of the freezing method of sectioning it is relatively easy to prepare suitable sections with inexpensive equipment, and such methods are becoming more common.

This report is an attempt to describe methods by which slides can be prepared within the budgetary means of a biological laboratory.

MATERIALS

A. Equipment

It seems desirable to describe first the equipment and reagents necessary for the microscopical examination of either smears or sections.

Smears require only 1 in. × 3 in. glass slides, teasing needles, staining solutions and cover slips.

The preparation of sections requires a material to support the tissue block (imbedding material) and a means of cutting the block (microtome). The latter is the most expensive piece of equipment; however, there are available small "hand" microtomes [1]

[1] Hand microtomes may be purchased from the American Optical Company, priced approximately at $50.00.

that cut suitable sections (1).

Paraffin imbedding is not recommended for sectioning with a hand microtome, but either celloidin or frozen tissue blocks may be used. Celloidin is the more difficult process and is not used extensively; frozen and celloidin sections will be described herein.

With the exception of the microtome usual laboratory equipment will be sufficient for these techniques. A dissection kit is recommended for removal of the tissues from the animal.

B. Reagents

Several reagents are necessary for the preparation of histological slides, either smears or sections.

1. Fixatives. Fixatives are used in an attempt to preserve the elements of the tissues as closely as possible to their condition in life. One of the better solutions is a 10% formalin solution.[2] Tissues may be kept in this solution indefinitely without apparent deterioration.

2. Dehydrating agents. Alcohol is used for all but the final steps of dehydration. Either 95% ethyl or 95% methyl alcohol is necessary depending on the technique. Final dehydration, or clearing, is accomplished by creosote of beechwood, cajeput oil (2) or toluol.

3. Mounting media. For dehydrated sections it is necessary to prevent further drying and material sealing the glass cover slip is necessary. Balsam is a standard mounting media but more recently synthetic resins[3] have been described that seem superior.

4. Stains. The selection of the stain depends upon the histological structures that are to be demonstrated (3). The object in staining cells is to produce a union between a dye and cellular structures resulting in a color difference. Contrasting colors are usually employed although in some techniques one color is sufficient.

(a) *Smear stains.* There are two common stains used in blood smears, Wright's stain and the Giemsa[4] stain. These are inexpensive to purchase but are rather difficult to compound from the ingredients.

Recently a stain for epithelial smears has been described (4, 5) by Papanicolaou,[5] but this procedure is not entirely new (6). These stains should be purchased ready mixed because it is more expensive to purchase the ingredients and compound the staining solution when only a few slides are to be prepared. It has been found possible to use Wright's stain on epithelial elements and the Papanicolaou stains on blood smears, so that one staining procedure will suffice. See Figure 1.

Figure 1. Epithelial cells. Lining of the mouth. ×450, stained with blood stain.

(b) *Impregnation stains for teased preparations.* In this method the stain is brought in contact with a block of tissue until the structures to be observed have adsorbed the stain. Gallocyanin[6] may be used for cellular preparations (7), gold chloride[7] will produce

[2] Formalin solution. Prepared by dissolving 10 ml. of formalin solution in 90 ml. of 0.87% sodium chloride solution.

[3] Synthetic mounting media may be purchased from the Hartman-Leddon Company, Philadelphia, Pennsylvania.

[4] Wright's stain may be purchased from the Hartman-Leddon Company, Philadelphia, Pennsylvania. Giemsa stain from the Gradwohl Laboratories, St. Louis, Missouri.

[5] Papanicolaou stains may be purchased from the Ortho Pharmaceutical Company, Linden, New Jersey.

[6] Gallocyanin may be purchased from the National Aniline Company, and it is prepared in the following manner. Heat to boiling 100 ml. of water and add 10 grams of $K_2CR_2(SO_4) \cdot 24\,H_2O$ and bring to a boil. Add the gallocyanin and boil for 5 minutes, filter and keep in dark bottle. Stain must be filtered each time before use.

[7] Gold chloride may be purchased from Mallinckrodt Chemical Company, St. Louis, Mis-

suitable staining of the nerve structures in muscle blocks and demonstrate cross striations of mammalian skeletal muscle (8). Impregation reactions cannot be controlled and sometimes proved to be disappointing. See Figure 2.

Figure 2. Motor end plates. Rabbit. ×160, stained with gold chloride stain.

(c) *Progressive staining.* This type of staining consists of bringing the tissue sections in contact with the stain and permitting the reaction to continue until adequate density of color is present in the tissues. This is the most common type of staining reaction and many staining solutions are described (9, 10, 11, 12). The solutions required for the simplest staining reactions are gallocyanin, hematoxylin,[8] eosin and phyloxine.[9] See Figure 3.

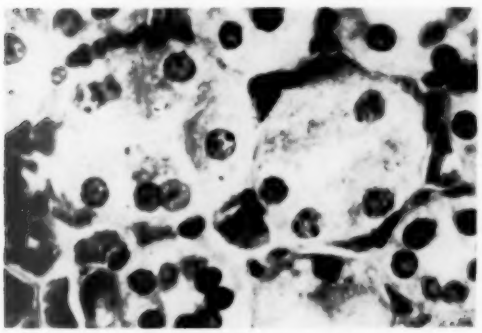

Figure 3. Epithelial cells. Lining the collecting ducts of the kidney. Rat. ×460, stained with gallocyanin and phyloxine.

souri, and is a 1% solution in distilled water, and should be aged 24 hours before using.

[8] Hematoxylin dry may be purchased from National Aniline Company or ready prepared from Ortho Pharmaceutical Company, Linden, New Jersey.

[9] Phyloxine may be obtained from National Aniline Company.

[10] Albumin can be purchased from Hartman-Leddon Company or made from the albumin of an egg with a small crystal of thymol added to preserve it.

METHODS

A. Methods for preparing non-sectioned tissues

1. Smears. The essence of the smear technique is to produce a thin film of material on a glass slide (1 in×3 in.) and stain so that the various cellular structures can be seen.

(a) *Blood smears.* Place a drop of blood on one end of glass slide and draw a cover slip (held at right angles) through the drop and toward the opposite end. No further manipulation is necessary, except staining.

(b) *Epithelial smears.* Scrape the surface of a mucous membrane of a living animal, or the surface of an organ after removal, with a dull scapula and transfer the cells to a slide which had previously been covered with a very thin layer of albumin.[10] Before the cells dry place the slide in a solution of 95% ethyl alcohol and ether, equal parts, which fixes the cells. The slide should remain in the fixative at least 30 minutes before staining.

(c) *Crushed sections.* Organs or tissues may be stained *in toto* by an impregnation method and rather than sectioning may be mounted by crushing. Relationships of the microscopical elements are lost but the cellular characteristics of various organs may be observed. The tissue should not be more than 2 mm. square and is placed on a clean slide. The cover slip is placed over the tissue and forced down. A synthetic mounting media should be used to seal the cover slip if a permanent preparation is desired.

2. Stretching. In some instances it is desirable to demonstrate the cellular characteristics of thin membranes. The membrane freshly removed from an animal is stretched over a glass slide, glass ring or pinned to the flat surface of a cork. The membrane may or may not be fixed and stained. It is then transferred to a clean glass slide and mounted.

3. Teasing. For tissues that are too resilient to be mounted by crushing it is some-

times necessary to tease, by means of fine needles, the elements apart. Fibrous connective tissue and muscle may be prepared in this fashion. The tissue is removed and fixed in formalin for at least 24 hours. The block or the teased elements may be stained before mounting.

4. Grinding. This method is an efficient but tedious process for preparing bone or tooth slides. A thin section of the material is rubbed over the surface of an emery stone until transparent and mounted dry on a glass slide. No staining is necessary.

B. Methods of staining non-sectioned tissues

1. Smears. Although blood and epithelial smears are prepared differently it has been found in this laboratory that either type of stain can be used to demonstrate cellular characteristics of both preparations. See Figures 1 and 2.

(a) *Wright's staining method.*

Prepare the dry smear of blood.
Flood smear with Wright's stain for sixty seconds.
Flood (without removing stain) slide with *methyl* alcohol.
Add distilled water drop by drop until greenish scum appears at the edge of the solutions. Leave the solution three minutes.
Rinse several times with distilled water, sixty seconds each.
Blot dry (filter paper), cover with mounting media and cover with glass cover slip.

(b) *Papanicolaou's staining method.*

Remove slide from alcohol-ether fixative.
Without drying immerse in 95% ethyl alcohol, for 90 seconds.
70% ethyl alcohol for 90 seconds.
35% alcohol for 90 seconds.
Harris hematoxylin for two minutes (the time may vary in this solution and proper interval should be ascertained for each solution).
35% ethyl alcohol.
50% ethyl alcohol.
Stain in OG–6 one minute.[11]
Wash in several changes ethyl alcohol (95% for 60 seconds each).
Stain in EA–50 for two minutes.
Rinse in 95% ethyl alcohol.
Clear in xylol (several changes) if the slide is cloudy clear in beechwood creosote, cover with mounting media and place cover slip in place.

For teasing techniques impregnation methods are best suited.

(c) *Gold chloride for muscle, nerve fibers and motor end plates.* (Designed for mammalian tissue.)

Fresh muscle blocks 4 mm. sq. fixed in 10% citric acid 10 minutes.
Gold chloride solution (1%) for six minutes.
10% formic acid solution for twenty hours.
95% methyl alcohol and glycerine (equal parts) for 48 hours.
Tease, mount in glycerine and seal cover slip with synthetic resin.

The above method does not demonstrate the nuclei of the muscle fibers. If nuclei of the muscle fibers are to be stained, the following technique may be used.

(d) *Gallocyanin for muscle blocks.*

Fixed muscle block (in formalin) no larger than 3 mm. sq. washed in running water for two hours placed in gallocyanin.
Heat the gallocyanin with the muscle to 40° C. for 2 hours.
Tease, mount in glycerine; or dehydrate and mount in synthetic resin. Blocks may be sectioned by the freezing method if desired.

(e) *Gallocyanin for membranes.*

Membrane stretched over cork is immersed in gallocyanin solution and heated to 40° C. for 4 minutes.
Dehydrate and place on glass slide.
Mount in mounting media and place cover slip over the tissue.

C. Methods for preparing sectioned tissues

1. Celloidin method.[12] This method is

[11] OG–6 and EA–50 are the Papanicolaou stains.

not used extensively in biological laboratories but is adaptable to the hand microtome described.

Formalin fixed tissue is washed thoroughly in running water (2 hrs.).

Dehydrate by immersion in increasing strengths of alcohol until 95% is reached. 15 minutes are sufficient in each solution with tissue blocks no larger than 5 mm. sq.

Wash for 5 minutes in three changes of alcohol.

Transfer to 95% alcohol and ether—equal parts.

Transfer block to a 5% solution of celloidin [11] and keep bottle tightly corked for ten hours. Enough celloidin should be placed in the bottle to be equal to 4 times the volume of the block.

Remove the top from the bottle and permit the celloidin to harden, about 24 hours is necessary for this process. If a small incubator is available the time may be shortened but the temperature should not exceed 40° C. Warming the bottle in a water bath will accomplish the same result.

Remove the tissue imbedded in the celloidin and place in 80% ethyl alcohol. Permit the celloidin to harden until it is the consistency of gum rubber.

Fix the tissue with a thin covering of celloidin to a block and affix in the microtome.

Draw the knife blade across the block, remove the sections and place immediately in 80% alcohol. Sections will be cut 5 micra to 20 micra.

Stain with hematoxylin or gallocyanin.

2. Freezing method. Carbon dioxide gas is used to freeze the tissue.

Remove the tissue from the formalin fixing solution and place, without washing, on the freezing chamber of the microtome.

Turn the carbon dioxide on and off several times until the tissue is frozen solid.

Draw the knife blade over the frozen tissue, remove the section and place it in water. (It may be necessary to make several cuts before the tissue is the proper consistency for adequate sections.) Sections can be cut at 10 micra with practice. Routinely sections can be cut at 15 micra.

D. Methods for staining cut sections

1. Hematoxylin and eosin stains. (Either the celloidin or frozen sections may be stained by this method.)

Place sections by means of a needle or perforated section lifter [13] into Harris hematoxylin. Staining should continue for about 30–60 seconds. Several trials may be necessary to obtain a proper density of stain in the nucleus.

Wash in distilled water (neutral water is best).

If overstained destain in a 0.5% acid alcohol solution, if understained intensify the stain by immersing 30 seconds in a 0.5% basic alcohol.

Wash in neutral distilled water 30 seconds.

Dehydrate to 75% ethyl alcohol.

Counterstain in a 1% solution of eosin (bluish) in 80% ethyl alcohol.

95% ethyl alcohol for 60 seconds.

Clear in beechwood creosote or xylol for two minutes.

Mount in mounting media and cover.

2. Gallocyanin and phyloxine staining. (Most efficient in staining frozen sections.)

Transfer the sections to the gallocyanin solution and warm not to

[12] Celloidin dry may be purchased from the Mallinckrodt Chemical Company, St. Louis, Missouri, dissolved in equal parts of ether and 95% ethyl alcohol. The consistency should be slightly thicker than water. A 5% solution can be purchased from Hartman-Leddon Company.

[13] Perforated section lifter may be obtained from the A. S. Aloe Company, St. Louis, Missouri.

exceed 40° C. for two to three minutes (there is more tendency to understain rather than overstain in this step).

Wash in distilled water.

Dehydrate in increasing strengths of alcohol to 95%.

Stain in a 1% solution of phyloxine in 95% alcohol.

Complete clearing in beechwood creosote and toluol (30 seconds in each solution), mount and cover.

(Frozen sections have a tendency to become curled; this is usually rectified in the beechwood creosote solution, the sections can be straightened by teasing needles.)

CONCLUSIONS

Long staining methods have not been described but can be found in books on histological technique (13, 14, 15), and adapted to the described sectioning techniques. The aim in describing histological methods in this paper has been to mention only those procedures that are simple to use, therefore usually produce adequate results, and are economical so that an average biological laboratory may use them. It is possible for students to learn these techniques in a short time, which stimulates interest in biological subjects and produces increased knowledge of the microscopic structures of tissues and organs by direct visual observation.

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Bacteriology Project

SISTER MARY AQUIN, O.S.F.
Cardinal Stritch College, Milwaukee, Wisconsin

A project of great interest in our bacteriology class each year is the plating of chromogenic bacteria according to some pattern or design. Each student chooses her own pattern as also the bacteria she wishes to use. The organisms chosen most frequently are *Serratia marcescens*, *Bacterium violaceum*, and *Staphylococcus albus*. The design is planted on sterile nutrient agar in a Petri dish with an inoculating or long dissecting needle.

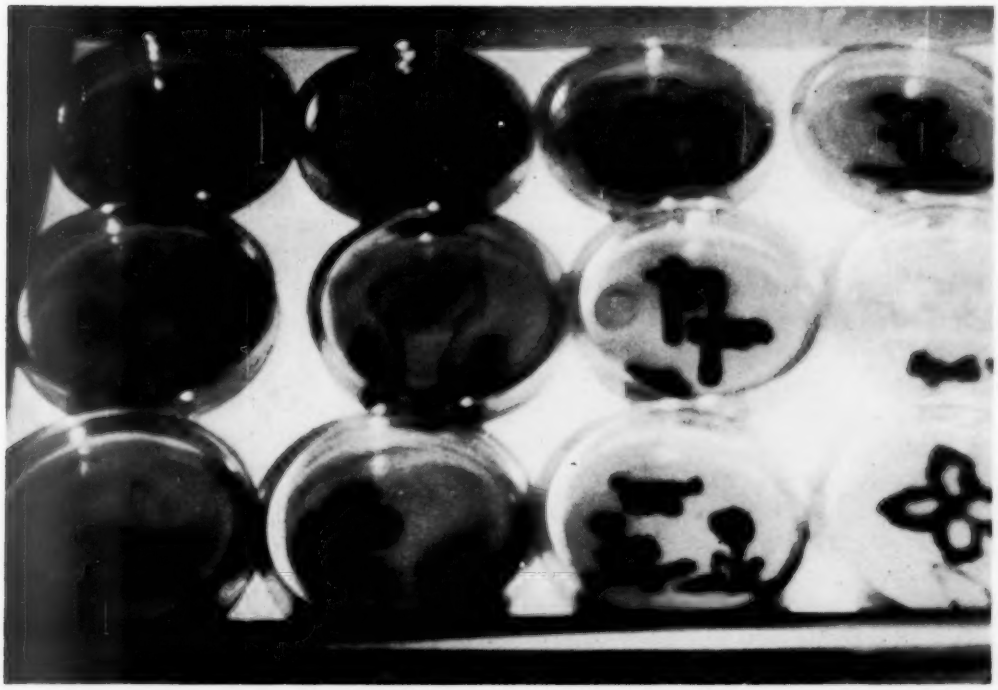
The idea for the project is by no means original. However, it has created so much interest among the students that other bacteriology classes might wish to try it. An unidentified magazine article, brought to our laboratory a few years ago, gave us the incentive. The picture in the article showed Dr. George Valley, assistant director of research at Bristol Laboratories, Syracuse,

New York, with his "beautiful bacteria" and a variety of designs on culture plates. The enthusiasm aroused by the posting of this clipping on the bulletin board so stimulated the interest of the class that a number of students immediately made arrangements to try this experiment. The results obtained were included in our bacteriology exhibit and were the subject of much comment. The class of the following year also tried. Members of the incoming classes, either having heard of or seen the project of the preceding year, look forward to performing a similar one. Why it should be so fascinating is difficult to say but the fact remains that it is. From techniques learned and previous observations the student has found that bacteria grow when planted on a favorable medium in a suitable environment, yet each new group of experimenters expresses surprise when designs become real growing cultures before their very eyes, so to speak.

In the past all species of bacteria used for a design were planted at the same time. However, in the future the suggestion will be made to the students to plant *B. violaceum* a day or two earlier because it grows somewhat more slowly than the other species.

In the accompanying photograph the bold outlines in the designs are of *S. marcescens*, while those of *B. violaceum* and *S. albus* are barely visible. The face of the clock (upper row) attracted particular attention. Contamination sometimes occurs as shown by the blot on the second plate in the lower row.

Is there any practical value in a project of this kind? Maybe not. The hand guiding the inoculating needle must be steady so that the desired design may be obtained, and contamination must be guarded against; both of which techniques may be learned in a more routine fashion. The one thing it does do is give the student the joy of accomplishment which is great encouragement for the beginner. Try it and see.



A Message from the President

Our Cleveland meetings have just been concluded and your officers have made some resolutions for the New Year. We want to share these with you now because we need your help in carrying them out.

We were told by one of the speakers at the Cleveland meetings that a survey now being summarized will show that more students are enrolled in the General Biology course than in any other science course now offered in high school. This means that most students are now taking biology at some time in their high school careers. For many of them this will be the last science course that they will take before they become homemakers and active, responsible citizens. The realization that we are the only national organization devoting all of our energies to the improvement of biology teaching should stimulate all of us to further efforts. We have a major responsibility to see that the members throughout the nation have an opportunity to assist in this improvement. You can do this by helping us carry out the following resolutions:

1. Double our membership in 1950–1951.
2. Have State and Regional Programs and Membership Chairmen in all parts of United States.
3. Sponsor joint meetings with other educational, scientific, and biological groups in all parts of the country.
4. Triple the financial support of our magazine.
5. Increase the effectiveness of our magazine, increase its size and attractiveness.
6. Continue the fine work of the Committees on Health, AAAS Cooperative, Membership, and Affiliated Groups.
7. Reactivate our Committee on Conservation and combine it with the Camping Committee as a new Outdoor Education Committee.
8. Establish new committees to work on the Constitution and By-Laws, Teaching Materials, and Liaison with other groups.
9. Use as many offers of help from your members as possible on the various committees and in your areas to promote the improvement of biology instruction and the NABT.

We welcome your interest and support and urge that you begin now to help us interest others in NABT. Start making plans for some projects in your area.

DICK WEAVER

WRITE to *Bituminous Coal Institute*, Southern Building, Washington 5, D. C., for *Coal at Work*, twelve pages, illustrated. Or to *Milton Bradley Company*, 811 South Wabash Avenue, Chicago 5, Illinois, for a pamphlet on the use of crayons, with methods of blending. No doubt worth your while for drawings made in the laboratory. It is illustrated with four-color plates of crayon sketches. This company or similar ones is missing a good bet in ABT advertising by not using it. *The Wheat Flour Institute of* the Millers' National Federation, 309 West Jackson Blvd., Chicago 6, has a quantity of material on nutrition and how to teach it at various grade levels. *Minnesota Mining and Manufacturing Company*, Saint Paul 6, Minnesota, has a comprehensive booklet on interesting ideas for the class room on how and where for tape recorders. Money raising for your organization or school; write *Sunshine Arts Studio*, 115 Fulton Street, New York City 8, New York. It is card selling with an offer attractive to organizations and groups. Film, 16mm sound, black and white, (color also), 10 minutes, *Let's Catch Fewer Colds*, AMA approval, Coronet; *see* your local distributor. An article in *Cenco News Chats*, Number 68, Summer 1950, is written about the Electron Microscopes. You may purchase one for about six thousand dollars if you have that kind of money floating around.

CONDENSED MINUTES OF THE CLEVELAND MEETING

December 27, 1950, 8 A. M.

Meeting called to order by President Lockwood. Discussion of various topics, including financial status of NABT, election results, health and conservation. Absence of quorum because of transportation delays prevented official action. Meeting postponed until following evening.

December 28, 1950, 7:30 P. M.

Meeting called to order by the new president, Richard Weaver, seven officers and 17 other members of the Representative Assembly present.

Report of election committee as follows: President, Richard Weaver; President-elect, Harvey Stork; First Vice-president, Aldina S. Gates; Second Vice-president, Leo Hadsell; Secretary-treasurer, John P. Harrold.

Treasurer reported total receipts for 1950 of $6728.55 and total disbursements of $5548.99, with an apparent balance of $1179.56. Advance memberships for 1951, 1952, 1953 and 1954 amount to $2101, which together with bills still payable, make a net actual operating deficit of $978, however.

Secretary's report indicated 959 paid up for 1951, with 759 old members not yet paid. Over 200 new members added to roll.

Editor's report emphasized need for more manuscripts with illustrations and need for new associate editors for South and Far West.

Managing editor reported new advertising rates and collections on outstanding advertising accounts.

National membership chairman Gourley reported on plans for the year and arranged for a meeting on Friday morning, for the purpose of working out plans for nationwide membership programs.

Prevo Whitaker, NABT representative on the Cooperative Committee, reported on the activities of the committee and was reelected for a three-year term. Reports of the activities of this committee are published from time to time in The American Biology Teacher.

A new Conservation and Outdoor Education committee was established, with Lydia Elzey as chairman. A new committee was established to explore the possibilities of improvement of teaching aids available from the industries based on biology. A committee was set up to study desirable or necessary changes in the constitution and by-laws of NABT. Ruth Dodge was reappointed to continue as coordinator of affiliated societies. A Liaison committee to work with other organizations to expand the services of NABT was created, with Edgar Martin as chairman.

CORONET FILM

Let's Have Fewer Colds. (One reel, sound, color or black-and-white; Educational Collaborators: Donald A. Dukelow, M.D. and Fred V. Hein, Ph.D., Consultants in Health and Fitness, Bureau of Health Education, American Medical Association.) Simple practices can reduce substantially the number of colds we get each year and this film dramatically points out these habits. Children—and their parents—learn here the importance of avoiding contact with people having colds, avoiding chilling or overheating and establishing good health that will prevent colds. (Primary, Intermediate, Adult.)

SLIDES

A new set of visual aids, based on the recent book, *Botany: An Introduction to Plant Science*, by W. W. Robbins and T. E. Weier, was issued in October by the publishers, John Wiley & Sons. Consisting of 300 color slides, the set contains line drawings, photographs, and a large number of photomicrographs chosen by the authors to emphasize important structural details of botanical specimens. Although each slide is carefully coordinated with corresponding sections in the Robbins and Weier "Botany," the collection provides a valuable supplement to any textbook on the subject. The "Botany" slides are the fourth set of visual aids prepared by the publishers in conjunction with their textbooks. Others are "Historical Geology," by Carl O. Dunbar, "Physical Geology," by Longwell, Knopf, and Flint, and "Foundations of Psychology," by Boring, Langfeld, and Weld.

BIOLOGY LABORATORIES

By "The Old Fossil"
At Lane Tech, Chicago

Zoos. The biology class with a good zoo at its disposal for visitation is fortunate. Students in so fortunate a class have an opportunity to obtain information regarding animals which can not be obtained by any other method. A trip to a zoo is an adventure; an intercontinental experience. Students will find generically related animals from several continents housed side by side. Concurrently they learn zoological taxonomy and nutrition; and geographical distribution and habitat. An experience my classes will never forget took place at Lincoln Park Zoo, in the Reptile House. They watched a snake about three feet long while it captured, ate, and swallowed a pine lizard. The earliest public zoo on record was established in Paris in 1793. However, they fed Christians to the lions in ancient Rome so there must have been a semblance of a zoo at that time. The first zoo in the United States was located at Philadelphia, in 1874. Today there are about thirty-five major zoos and a number of smaller ones. All large zoos maintain a fully equipped hospital to care for the ills of their animals. These are staffed not only with full-time attendants, but also with veterinarian, physicians and surgeons. Dietetic specialists supervise the preparation of food for each animal according to its needs. Attendants report zebras are the most troublesome animals. Giraffes easily get their necks broken, so must be housed and handled carefully.

Creating interest in dogs and other pets. Science classes in elementary schools, to create an interest in pets, could take a popularity poll of them in the class or school or even in the community. If the poll is taken about dogs the findings of the American Kennel Club will be of interest. They report that the top ten dog favorites are: 1. cocker spaniel, 2. beagle hound (evolved from cross breeding small foxhounds), 3. collie, 4. boxer, 5. Boston terrier (a medium between bulldog and terrier developed in Boston about 1800), 6. dachshund, 7. Pekingese, 8. English Springer spaniel, 9. Mexican (hairless) Chihuahua, 10. German shepherd (police dog). Another elementary school activity is the pet parade. It is quite a popular project adopted by summer camps. The junior member of the firm took a first prize with her pet hamster in a pet parade in her summer camp.

The tallest, largest, and perhaps the oldest living thing is the "Founders' Tree" located in the Redwood Empire north of San Francisco. It is 364 feet high. . . . In this same county is the only whaling station on the North American continent. . . . Only the finest of Angora goat wool produced in the Turkish province of Anatolia is used for oriental rugs. . . . If you are doing a research problem in biology the 150-year-old Library of Congress houses nearly thirty million items of value, which are at your disposal. . . . Microscopic examination of cotton cloth woven about 3000 B.C. reveals no great discrepancy in that and the fibers of today. . . . Wheat seed found in the tombs of Egypt did not germinate as has been falsely rumored. Wheat has been known to have been cultivated in the "Fertile Crescent" nearly ten thousand years ago.

An "ellis island" for animals. All animals imported into the United States are detained for a period at the United States Quarantine Station. This is a fifty-two-acre tract in Athenia, New Jersey, founded in 1900. This detention applies to all animals imported for exhibition, breeding, or commercial use or to replenish herds on dairy and other farms. Animals are held for a minimum of fifteen days. Cattle and swine are held for the maximum limit of thirty days. They may harbor highly infectious diseases and this double precaution is practiced. The mongoose, for apparent security reasons, is turned back at the station. It is not even permitted to be exhibited in zoos. The best a zoo can do is to display a taxidermic specimen. In 1880 a shipment of European cattle brought into the United States an epidemic of pleuropneumonia. This resulted in millions of dollars worth of damage to cattle herds in this country. Congress enacted laws which resulted in the establishment of the present station. The personnel

are carefully decontaminated every time they leave the station. For the same significant reason visitors are not welcome at any time.

CHICAGO PARK DISTRICT. During the war about a fifth of my students secured employment with the Chicago Park District during the summer months. The CPD at that time was in need of biologically minded boys. Since trained personnel is hard to get, CPD holds inservice training for its employees. I still place an occasional graduate with them. To get an idea of the CPD, there are seven thousand acres in 150 parks. These are landscaped and most have one or more field houses on them. Annually they use 25,000 pounds of grass seed. In their greenhouses they grow approximately 200,000 seedlings and propagate 250,000 cuttings each year, besides the thousands of bulb plants and perennials they have on hand. These are boosted with 150 tons of fertilizer. If you are contemplating a visit to Chicago write to my good friend Fred. G. Heuchling, Director of Publicity, Burnham Park Building, Chicago Park District, Chicago, for points of interest to visit in the District areas. If you contemplate bringing your classes by bus, train, or auto, write to him ahead of time. He will furnish you with a trained guide at any park for a conducted tour; it will be free. It is not uncommon to see groups of students from colleges and other schools as far away as three hundred miles.

HOW TO STUDY, the pamphlet mentioned in the April 1950 issue, brought forth comment. Mrs. Mary E. Clark of Missouri: "All students need help along this line." Miss Elizabeth Dunlap of Lexington, Virginia: "I was interested in your paragraph on the first week of school in your biology course. I wish you would develop this theme further in an early issue of the Journal." (With the permission of the editor I will do that soon.) S. M. Pattee, of Cedar Rapids: "I would like to develop a 'How to Become a Better Reader' sheet to be handed to some of our poor readers." If you have any ideas about this write to S.M. at Roosevelt High School, Cedar Rapids, Iowa; or the Old Fossil will clear it for you.

SCHOOL GREENHOUSE. Mr. Ivory C. Manning of Mississippi has a daily program divided between chemistry and biology. In addition he has charge of the school greenhouse. He was interested in the method of placing it in charge of third semester boys for maintenance. Boys not planning on going to college, if they bring a written request from their parents, are permitted to take a third and fourth semester of biology. They maintain the greenhouse at a professional standard of excellence.

WRITE DR. GILBERT O. RAASCH, Illinois State Geological Survey, Urbana, Illinois, for *Aids to Schools and Teachers*. This has some attractive titles for you to choose from. He is head of Educational Extension Division. These aids are in mimeographed form.

THE OLD FOSSIL is still buried in the mid-century cultural debree of 1950. If you would like to unearth him for any reason, get out a three-cent postage pick and shovel and let the federal post filter it thru to 5061 North Saint Louis Avenue, Chicago, 25.

REVIEWS

NIXON, ALFRED F. *Teaching Biology for Appreciation*. 1st ed. Chapman and Grimes, Boston. 143 pp. + index. illus. 1949. $3.00.

Teachers of biology will find in this authoritative book a valid foundation philosophy, and numerous techniques and activities, for integrations which biology can and should make with other subject-matter areas. Teachers of the fine arts, industrial arts, music, literature, and the social studies will also find suggestions for correlating their course work with the sciences. The first four chapters are devoted to a justification of teaching the sciences for appreciation, and present evidence that the sciences in general and biology in particular can be made functional and emotionally appealing to the non-specialist aside from factual knowledge, problem-solving techniques, and the inculcation of scientific attitudes. The remaining three chapters suggest aims, attitudes, materials, and techniques which may aid teachers of biology in developing appreciation through art, literature, and the social studies.

Some parts of the text matter imply that

the author may at times be confusing certain phases of appreciation with unscientific "purposeful" activities assigned to living organisms. All photographic illustrations are grouped near the middle of the book; several are lacking in detail, where clearer detail would be helpful to the reader. There are a number of typographical errors, as for example on pages 68, 69, 74, and 88. A comprehensive bibliography appears at the end of each chapter. The index is complete and usable. *Teaching Biology for Appreciation* can be read with profit by all teachers in the secondary schools, and in general is a worthwhile contribution to the field of science education.

B. Bernarr Vance

McAvoy, Blanche and Harold Moore. *Biology, A Study Guide.* 2nd ed. Burgess Pub. Co., Minneapolis, Minn. ii + 191 pp. Mimeoprint with spiral binding. illus. 1950. $2.50.

This complete biology study guide for class and laboratory use should prove quite adaptable for college preparatory pupils in high schools, for teacher training use, and perhaps for some classes in general biology in junior colleges. It is too technical for 10th-year general biology sections in the average high school. The informative text matter is clear and concise. The mimeoprint is of good size and readable. A few minor typographical errors appear, as on page 73 where "cats" has become "oats." Technical terms, of which many are used, are underlined for emphasis and review. The arrangement of topics is seasonal, with eleven chapter headings. Their continuity permits rearrangement and changes to suit local conditions. Two identification keys for native trees, and one for common molds, are included. The line diagrams are large, simple in detail, and are for the most part done at pupil level. There is a good discussion of simple biochemistry in the chapter on foods, which includes photosynthesis.

Using the book as a laboratory guide would necessitate keeping a separate notebook for completing laboratory exercises, and for recording written assignments. Books for general and special reference reading are listed; they are not referred to by page numbers. Special book reports are also suggested. For the most part, the experiments can be performed with readily obtainable and non-technical apparatus and materials. Many excellent original experiments, which involve sound principles of scientific method, are included. The sections on photosynthesis and respiration, and on diffusion and osmosis, are especially good. Most of the experiments could be done either individually, by small groups, or used as teacher demonstrations. A number of challenging projects are suggested for more advanced biological investigations.

B. Bernarr Vance

Bawden, F. C. *Plant Viruses and Virus Diseases.* 3rd ed. Waltham, Mass.: The Chronica Botanica Co.; New York City: Stechert-Hafner, Inc. XV + 335 pp. illus. 1950. $6.00.

This entirely revised edition of *Plant Viruses and Virus Diseases* is a worthy contribution to the New Series of Plant Science Books. In recent years much research has been done, especially on the factors that affect the spread of virus diseases and the insect vectors which are responsible for spreading virus diseases. Chapter Four discusses the methods of transmission and Chapter Five considers the relation between viruses and their vectors. The scope of the book is illustrated by a few of the seventeen chapter headings: Mutation, Interference Between Strains and Recovery from Diseases, Serological Reactions of Plant Viruses, The Purification of Viruses, The Crystallinity of Plant Viruses, Taxonomy of Viruses, and Control Measures Against Virus Diseases. In discussing the various topics the author has given a brief review of the results of earlier research which serves as a background for the better understanding of the progress in present-day research on the study of viruses.

To make the book readily usable the author has provided a list of illustrations, a list of tables, a general index, and an author's index. Each chapter has an extensive list of references for additional reading. Because the book contains a wealth of material on recent advances in the study of viruses; it will be welcomed by those working in this specialized field. It is for the specialist and not for the layman; consequently, it is too

advanced for high school reference use.

MELVIN A. HINTZ,
South Milwuakee High School,
South Milwaukee, Wisconsin

RICE, CRAIG, SCOTT, *Biology Careers Chart-Manual*, Rice Research Associates, 6500 S. Dorchester Ave., Chicago 37, Illinois, 98 pp., 1950. $2.00.

This useful little book covers the most important aspects (statistics, requirements, duties, earnings, employment loci, working conditions, advantages, disadvantages, specializations, women in the field, future, affiliations and miscellaneous features) of 32 different biological careers, under the headings of general biology, botany and agriculture, zoology, general professions and technicians. There are separate chapters on securing a position and pre-scientific deferments and ratings, also a list of career-education locations.

The book, designed for biology majors, advisors and counselors, represents a careful attempt to compile in as few words and as little space as possible the pertinent data of biology careers. It is necessarily oversimplified, the statements are incomplete and must be used with a certain amount of local adaptation. This is not a criticism, for a full analysis of each vocation would fill a large volume and defeat the purpose of this book. The *Biology Careers Chart-Manual* should prove highly useful to anyone involved in helping young folks who are interested in biology as a career. It is to be hoped that frequent revisions will keep it up-to-date and of constantly increasing value.

JOHN BREUKELMAN

DEAN, H. L. *Laboratory Exercises, Biology of Plants*. Wm. C. Brown Co., Dubuque, Iowa. v + 265 pp. illus. 1949. $2.25.

Laboratory Exercises, which is a workbook of college botany, consists of basic information and experiments, drawings to be labeled and tables to be completed, and the factual type of questions. In *The American Biology Teacher*, Dec., 1945, there was a review of the first edition. This edition was revised in 1947, and in 1949 the typography was improved and several additional pen sketches were included.

The high school teacher will find a copy of such a manual useful for interesting demonstrations and for supplying special projects for students.

ROBERT C. MCCAFFERTY,
Central High School,
Wadsworth, Ohio

BARNETT, ANTHONY. *The Human Species*. W. W. Norton & Company, Inc., New York. x + 280 pp. illus. 1950. $3.75.

The author, an Oxford scientist, presents in this work the why and wherefore of the human mechanism as it relates to practical biological and social problems. Free from the annoyance of biological terminology, the book may be read with understanding by anyone interested in man and his problems.

Part One deals with Heredity and Reproduction, describing the organs and the principles involved in the succession of stages that intervene between the egg and the adult. Included in this portrayal are the ways in which the variables of nature and nurture interact.

Part Two depicts Human Diversity. Beginning with man's ape-like ancestors, there is a full and careful presentation of the know data which trace man as a product of evolution. With regard to modern man, the author notes differences of the various races such as skin color, ability, social worth, race theories, inequalities, and sex.

Part Three treats the problems of Life and Death. Five chapters are devoted to Man and Society, Food and Soil, Food and Nutrition, Death, and Population. Despite the fact that we have made great advancements in numerous phases of our complex society, man still suffers from many of the scourges of our ancestors of centuries ago. As stated, "If full use is to be made of biological knowledge for human benefit, human population must attain relative stability."

The book deals with some of the most pressing problems of our times. The author is to be congratulated for his farsighted presentation of the facts. Biology teachers, as well as laymen, will profit by an understanding of its contents. Sixteen plates, fifty-nine drawings and diagrams, a bibliography, and an index are included.

LEE R. YOTHERS,
High School,
Rahway, New Jersey

Editorial Comment

As has been mentioned many times, the columns of *The American Biology Teacher* are always open to letters from readers interested enough to write in. Sometimes these letters are really editorials, as in the case of the following one. Obviously in such cases, the opinions expressed are those of the writer of the letter; they may or may not agree with those of the editor, and do not represent any official statement of the journal. The points discussed by Professor Jones are highly important ones. *The American Biology Teacher* hopes that they will be studied carefully by many readers and that perhaps a few of them will be sufficiently interested to make further comments.

Dear Dr. Breukelman:

In January, 1950, you published an article by Dr. D. F. Miller, of the Ohio State University, entitled *Biology for Survival*. This was an important paper because, 1, it was effectively and interestingly written, 2, it contained several striking observations upon biological facts and, 3, it proposed the important, but not novel, doctrine that in order to survive mankind must imitate the "ruthless realm of nature" by refusing aid to the "incompetent" and allowing the struggle for existence full play. Since the last proposal was supported by a claim to be based upon "rational thinking," it seems necessary for a fellow biologist to examine the matter somewhat critically.

But before undertaking to criticise, let me state my prejudice fairly. I am of the opinion that "survival of the fittest" is both a misunderstood and misused phrase. Unless cooperation and mutual aid be accepted as being very important in survival, I would say that "survival of the fittest" applies neither to man nor to the other living things.

Yet my prejudice is clearly, in America today, a minority view. In the public press and in the legislative halls, holders of opposite views of man's road to survival are having their heyday. The power of arms is being invoked, and subsidized at an oppressive cost, while the power of reason (on the theory that only ourselves can be reasonable) is either discarded, or but weakly used, as in the Voice of America and by our representatives in the forum of the United Nations. The cooperative spirit and genius that built our nation, and that created our commonwealth by struggle among ideals and lawful competition among producers, is being dulled by the fear of Communist espionage within us. It is claimed by authors of our present sedition laws that only by such control of ideas and speech can we preserve ourselves as a nation. Thus, where so many are confronted by the supposed alternatives of survival as slaves to our own fears, or subjugation by the armed might of our enemies, Dr. Miller's article seems timely and appropriate. The Spencerian view that man must struggle in civil war seems to be the "official" view of the moment, and offers a fatalistic anaesthesia for the pains of our dilemma.

Because Dr. Miller has made an apparently "scientific" contribution to the thinking that leads to acceptance of our fear-imposed oppressions, and precisely because of this, it has seemed necessary to me as a biologist and teacher to make the following criticism. I hope it will be accepted as it is intended—an attempt to show the fallacious assumptions underlying Dr. Miller's argument, and thus to recognize the argument for what it is, opinion shared by many, but not supported by scientific evidence.

The body of thought from which Dr.

Miller's views on survival are inherited is known as Social Darwinism. According to several recent analyses of the subject, it began with Herbert Spencer, whose socio-economic theories attempted to justify the harshness of 19th century industrialism and imperialism. The privileged Englishman, like the privileged American, often wished to feel entitled by natural law to his wealth and power. By the doctrine of "survival of the fittest," it appeared that nature itself approved success through battle. More recently, the doctrine has been used by such diverse authorities as the leaders of German and Italian Fascism, the ultra-conservative branch of American politics, and, oddly perhaps, the dictators of the Kremlin (who merely substitute "proletariat" for "super race" or "captains of industry" favored by others). The history of social Darwinism is thus a story of use, by a strange company, indeed, of a political theory devised by a sociologist.

But the history of this theory actually leads us to contemporary thought in America. In Darwin's name we are asked to substitute belief in force for belief in reason. The ideas that force is man's only safety, and that only the strong have a right to survive, and that (in Dr. Miller's eye-catching phrase) "this we must teach" are being substituted in many ways for the formerly held beliefs that right and justice are more valid in human affairs than naked power, that all human beings (not the strong and the powerful, only) have "certain inalienable rights," and that the things we must teach are not doctrines or dogmas, but facts and ideas, that free men may be able freely to decide for themselves what is right.

The pattern of change is plain, at least in two great nations. In Russia, even the scientist, under the pretentious dogma of Lysenkoism, is required to think and speak *in his sciences* according to orthodox ritual. In America, first government employees, and now all citizens, are required by law not to hold certain beliefs, and not to profess them, under pain of various penalties. The fact that the McCarran Act has received such overwhelming support seems proof enough that we are willing, as the supposed price of survival, to relinquish our liberties. We do this on the theory that only the strong (in the material and military sense) can survive, in this bitter struggle of man against man.

Dr. Miller and other proponents are wrong in claiming that this popular doctrine is based upon rational thinking. Rational thinking, in science as elsewhere, involves logical inference from true or at least probable assumptions. Yet the assumptions underlying Dr. Miller's assertion that love and kindness are harmful to our survival (man is said to be in danger of "loving and pitying himself out of existence") may be neither true nor probable, being present in the mind of the writer, perhaps, but not being elsewhere discoverable. The "reason" usually given as supporting the view that charitable treatment of the poor and kindness to the sick and insane harm our ability to survive is actually a weak chain of half-truths, traceable to Herbert Spencer's attempt to use Darwin's theory as a defense of privilege. I believe it goes thus: 1. In nature, only the strong and best fit survive the constant struggle (a half-truth; the word "individuals" inserted before "survive," and clearly implied in any such statement, invalidates the statement. For many societies of animals individually weak have survived very successfully, through cooperative behavior, in nature. Man is, I think, made up of such societies). 2. If (1) is true, then man, a part of nature, must, in order to survive, struggle competitively, eliminating the weak and helpless (again, half-true, because of the confusion between man the

species and man as individual. Granted that Man has a hard road to survival, it is a slip in logic to impute Man's struggle to his individual members; and it is a perversion of logic to imply that because Man must struggle, his members must fight among themselves).

This analysis of the supposed "rationale" of Dr. Miller's social Darwinism is based on available treatments of the subject by, among biologists, Allee, Dunn, and Dobzhansky, among anthropologists, Montagu, and among sociologists, Sorokin, for example. There is in the modern literature little or any echo of the position taken in Dr. Miller's paper, perhaps for the reason that biological and sociological facts do not support it.

While I recognize the right of anyone to hold such an opinion, I question (as would not all teachers, including Dr. Miller?) the propriety of saying of an opinion, "This we must teach."

ARTHUR W. JONES,
University of Tennessee,
Knoxville, Tennessee

LETTERS

Dear Professor Breukelman:

. . . I like to say something, if I may, about the whole organization of the Association of Biology Teachers. As it is now it meets neither the need for high school teachers nor those of college teachers. The same may be said of the Journal. The separation of activities into the high school level and the college level merit consideration.

Sincerely yours,
V. T. DIMITROFF,
Paul Smith's College,
Paul Smiths, New York

PREMEDICAL EDUCATION

This is a report on the first National Convention on Premedical Education held in the Lake Placid Club, Lake Placid, N. Y., October 21 and 22, 1950. These meetings were sponsored by Alpha Epsilon Delta, national premedical honor society. This was a joint affair, with the medical colleges represented either by their Deans, Chairman of Admissions Committee or by both. The colleges were represented by teachers of biology or the advisors of premedical students. The objective was to understand what the medical schools want and what the colleges are to teach.

The first address was given by Vice-Chancellor F. G. Crawford, Syracuse University, from the liberal arts colleges' viewpoint. He stressed the fact that biology, physics, and chemistry are the foundation for a scientific education. The question is not what we teach but how we teach. The liberal education of premedical students should include the humanities, fine arts, social studies, music and art of living in order to develop character. He advised avoiding concentration on strictly premedical courses and laying the broad foundation for the future physician. He asked the medical schools to make a survey of premedical education in order to orient the freshman about the requirements for medicine.

The second address, "From the Medical Schools' Viewpoint," was given by Dean Aura E. Servinghouse, Columbia University. The type of man wanted is the one who has three years of college work, including a year and one-half of chemistry, one year of biology, one year of mathematics and one year of English. The remainder of his education should be in the liberal arts field. The student must learn to think, and to explore in his particular field of activity. He must get away from specialization, be a scholar, and not a mere practitioner. The choice in education is not how much, but what and how, to study. The fact that chemistry and physics play an increasingly important role in biology does not mean that the latter is being replaced by the former. Medicine is still a continuation of biology. The medical schools look at the boy according to his ability and fitness for the profession of medicine. The balance between liberal arts and science is a factor. "The question is not how many tools he brings to medical school, but how sharp are these tools." The liberal arts colleges should provide: (1) the best atmos-

phere where a boy can mature; (2) meeting others who are reaching for new phenomena and social consciousness; (3) development of proper motivation by asking himself: What is my contribution to society? How can I do it best? Is this motivation a clear expression of my philosophy of life?

The evening address, "Education for Professional Service," was given by Dean Stanley Dorst, School of Medicine, University of Cincinnati. He pointed to the fact that every civilization had its peak of accomplishment, then gradually deteriorated into irreversible decadence. The implication is that we are approaching this period of decadence, as shown by the type of reading, radio and television programs. The taste for the classics and the enduring in cultural life is on the wane. He pleaded for the cultured, educated, scholarly, physician who is a leader, an inspiration and a dynamic influence in society. Let us again return to our spiritual heritage, our rugged thinking and to hard work.

In the round table discussions the central theme was a wide, liberal education for the premedical student. The liberal arts colleges should teach men to think, may it be, through the study of philosophy, English, physics, chemistry, biology, mathematics, public speaking or others. The advisors of premedical students should guide them to make their own dynamic decisions. The minimum premedical requirements are 48 credit hours in premedical subjects. The aptitude test is only a guidance in evaluating the student's preparation and the ability to think. Geographical distribution is a factor. The admission of Negro students in medical colleges is encouraging. Recommendation for admission to medical schools should be made by a committee consisting of one representative from chemistry, one from biology and two from the liberal field departments. This does not exclude individual recommendations. The medical schools have the responsibility of selecting the best talent before spending public funds or betraying public trust. Should not then the approximate amount of $2800.00, contributed by the medical schools per student per year, be invested in those students who will render the greatest good, the best service and most benefit to society?

V. T. Dimitroff,
Paul Smith's College,
Paul Smiths, New York

NEW OFFICERS

The results of the election of officers of The National Association of Biology Teachers for 1951 have been received from the secretary-treasurer. The elected officers, who have assumed their duties as of January 1, 1951, are as follows:

President: Richard L. Weaver, P.O. Box 1078, Chapel Hill, North Carolina.

President-elect: Harvey E. Stork, Carleton College, Northfield, Minnesota.

First Vice-President: Aldina Gates, Baton Rouge Senior High, Baton Rouge, Louisiana.

Second Vice-President: Leo F. Hadsall, Fresno State College, Fresno, California.

Secretary-Treasurer: John P. Harrold, 110 East Hines St., Midland, Michigan.

National Membership Chairman: Frances Gourley, Laporte High School, Laporte Indiana.

The new president received his B.S. from Pennsylvania State College and his Ph.D. from Cornell University, serving as Pack Fellow there three years. For three years he taught Biology, Nature Study, and Science in Maumee Valley County Day School in Toledo, Ohio. He taught three years at Dartmouth College, and one year at the University of New Hampshire. He is now serving as Program Director for the North Carolina Resource-Use Education Commission assisting public schools, teachers' colleges, and non-school agencies to increase their emphasis on conservation, biology, science teaching and wise resource use. He has taught in summer camps at Oglebay, Wheeling, West Virginia, Lost River Nature Camp, and at Plymouth Teachers College, New Hampshire. For three years he served as Educational Director of the Audubon Nature Center at Greenwich, Connecticut. He has been membership chairman for the Wilson Club for three years: secretary-treasurer of the American Nature Study Society since 1943, and served as secretary of the New Hampshire Bird Club. Mr. Weaver has been

a regular contributor to *The American Biology Teacher* and to numerous other scientific and educational journals.

Biographical sketches of the other officers appeared in the November issue. All of them have been active members of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS, having served on many different committees and performed many special duties. All of them are leaders in science education in their respective areas. All of them have broad interests and experiences that enable them to see the larger problems of science education as well as the immediate problems of the classroom. The editorial staff extends on behalf of THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS and *The American Biology Teacher* sincere congratulations and best wishes for a happy and constructive year.

CELLS ALIVE

One of the toughest problems in biology is how to take a microscope picture of a healthy living cell. Most tissue cells, whether animal or vegetable, are transparent to ordinary light. To make them visible they must be stained, and the stain either kills them or sickens them. They can be seen with special ultraviolet microscopes, but strong ultraviolet is also deadly to cells; only the picture of a tiny corpse appears in the photomicrograph.

Dr. Robert Barer of Oxford University, England, is sure he has licked the problem. He uses monochromatic (single wave length) ultraviolet at an intensity which is too low to hurt the cell. It is also too feeble to make a useful impression on a fluorescent screen or photographic plate, so Barer focuses the invisible image, enlarged with a reflecting microscope to about three inches in diameter, on a screen. Then, by means of a rapidly revolving mirror, he "scans" the image, throwing the ultraviolet light from a narrow slice of it into a photomultiplier tube. The faint glimmer of ultraviolet is thus changed into a fluctuating electric current that is powerful enough to form a bright curve on the face of a cathode-ray tube.

A series of these curves taken from successive slices of the image can be turned into patterns of light and shade, and built into a picture in ultraviolet of the still-healthy cells. But Dr. Barer is after bigger game. The curves show how much of the ultraviolet is absorbed by each region in the cell. These figures, in turn, give a strong hint of what chemicals are present in each of the cell's parts. Dr. Barer hopes that his apparatus will allow biologists to watch fragile, transparent cells as they live their normal lives and to chart the chemical reactions that take place inside them. When science can take a closer look at living cells, it will know much more about the delicate, mysterious chemical processes that are called life.

TIME, NOVEMBER 27, 1950

NATIONAL TEACHER EXAMINATIONS

The National Teacher Examinations, prepared and administered annually by Educational Testing Service, will be given at testing centers throughout the United States on Saturday, February 17, 1951.

At the one-day testing session a candidate may take the Common Examinations, which include tests in General Culture, Mental Abilities and Basic Skills, and Professional Information; and one or two of nine Optional Examinations, designed to demonstrate mastery of subject matter to be taught. The college which a candidate is attending or the school system in which he is seeking employment will advise him whether he must offer the National Teacher Examinations and which of the tests he should take.

Application forms, and a Bulletin of Information describing registration procedure and containing sample test questions, may be obtained from college officials, school superintendents, or directly from the National Teacher Examinations, Educational Testing Service, P. O. Box 592, Princeton, New Jersey. A completed application, accompanied by the proper examination fee, should reach the ETS office not later than January 19, 1951.

FILMS

SEE BETTER: HEALTHY EYES (1 reel, sound, color ($90.00) or black-and-white ($45.00); Educational Collaborator: Derrick T. Vail, M.D., Chairman of The Department of Ophthalmology, Northwestern University Medical School.)

How can we take care of our eyes? Why should we take care of them? In answering these two basic questions, this film explains the general structure of the eyes, the important health and safety practices relating to eye care, and the common ways to treat disorders of vision. The film has been viewed and approved by representatives of various professional groups interested in eye care and eye treatment. *Primary, Intermediate.*

HEAR BETTER: HEALTHY EARS (1 reel, sound, color ($90.00) or black-and-white ($45.00); Educational Collaborator: George E. Shambaugh, Jr., M.D., Associate Professor of Otolaryngology, Northwestern University Medical School.)

An understanding of *how* students hear is important to *what* they hear. This film stresses the pleasures that come through hearing well. In clear animation sequences, the structure of the ear is detailed and actual process of receiving air vibrations and transmitting them into "sounds" is shown. General information on how to take care of the ears is presented in conclusion. *Primary, Intermediate.*

RECENT PUBLICATIONS

The High School's Part in Tuberculosis Control, 1948, ill., National Tuberculosis Association, 20 pp.

Planning a program of tuberculosis education, basic information about the disease and its treatment suggested educational activities to be integrated into various high school subjects. Bibliography consisting of books, pamphlets, motion pictures, recordings, and slides.

The Field Scientific Liaison Work of UNESCO, 1949, Columbia University Press, 2960 Broadway, New York 27, N. Y., ill., 67 pp., $.30.

Description of international science activities sponsored by UNESCO.

LEGRIS, ROBERT. *Science Laboratories in Need*, 1949, Columbia University Press, 2960 Broadway, New York 27, N. Y., ill., 23 pp., $.15.

A brief summary of the urgent needs of science laboratories in war-torn nations of Europe and Asia.

KNEPP, THOMAS H. *The Human Reproductive System*, 1950, Wm. C. Brown Company, Dubuque, Iowa, ill., 50 pp.

Review of anatomy and physiology of human reproduction, written for high school level.

DUBRIDGE, LEE and AEBERSOLD, PAUL C. *Atoms at Work*, 1950, Murray and Gee, Inc., Culver City, California, ill., 49 pp., 1 to 10 copies, $1.00.

A discussion of power to be derived from atoms and radioisotopes and their uses. Especially intended for science and social science classes.

Annual Report 1949, Chicago Natural History Museum, Chicago, Illinois, ill., 140 pp., $1.00.

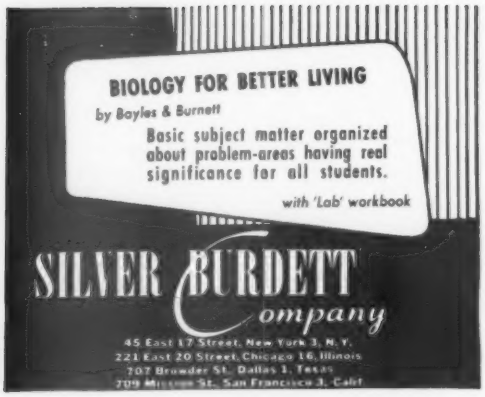
Annual Report of revisions and acquisitions of the Museum, including membership list and by-laws.

PFEIFFER, JOHN. *Genetics—The Science of Heredity*, 1950, Public Affairs Pamphlet No. 165, Pendray & Leibert, 55 West 42nd Street, New York 18, N. Y., ill., 32 pp., $.20.

A discussion of history and development of genetics, together with an explanation of the issues in the dispute over heredity now going on between scientists on the Western World and those behind the "Iron Curtain."

CUATRECASAS, JOSE. *Flora of South America*, 1950, Chicago Natural History Museum, ill., 113 pp., $1.75.

Two further contributions to the knowledge of South American plants: First: Study on Andean Compositae, Second: Studies in South American Plants.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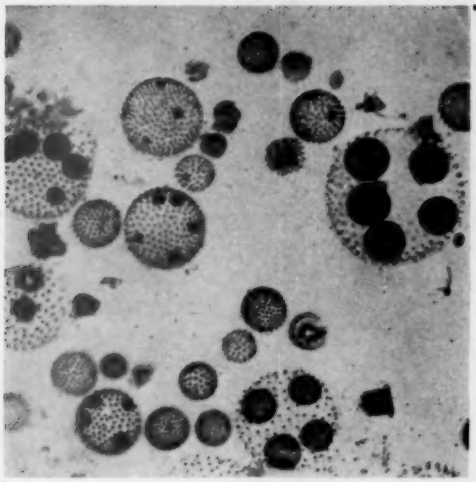

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